

to escape but could not release itself from its adversary's grip. When the snake's struggles weakened the frog slowly began to swallow it. I watched this performance for over 15 minutes until nothing but a few inches of the snake still remained. I think the snake was a wolf-snake, a harmless species.

BHAVNAGAR,
July 8, 1940.

R. K. DHARMAKUMARSINHJI.

[A number of notes have appeared in the *Journal* on 'Frogs eating Snakes'. In volume xxxvi, p. 161 of the *Journal* McCann records that the Bull-Frog (*Rana tigrina* Daud.) readily devours such small snakes as it can overpower. Eds.]

XVIII.—NOTES ON THE GEOGRAPHICAL DISTRIBUTION
AND LARVICIDAL PROPENSITIES OF *HORAICHTHYS*
SETNAI KULKARNI.

Observations made on fish fry collected by me from the territorial waters of Cochin and Travancore at Manjummel and Cheranellore in the months of May and June, 1938, have revealed the presence, among them, of larvae of *Horaichthys setnai*, the sole known representative of a new family of fish recently described by Kulkarni (1940, pp. 379-423). Regarding the distribution of the species, Kulkarni records it as occurring in the coastal areas about '100 miles north and south of the city of Bombay'. After the larvae were found, adults were looked for and collected on various occasions from Manjummel and Cheranellore from shallow inlets within tidal influence of the backwaters. It is thus evident that the fish thrives and breeds in the coastal backwaters of Cochin and Travancore. In all probability, the fish extends throughout the western coast of Peninsular India.

Regarding the feeding habits of the fish, Kulkarni lists 'copepods, diatoms, minute crustacean larvae, etc.' as the main items, while he mentions, amidst the stomach-contents of the fish, 'fine particles of sand, pieces of grass, leaves and other debris', which evidently do not form part of its diet. Observations made by me on the larvicidal tendencies of the fish, however, show that it is destructive to mosquito larvae of the first and second instars whenever available. As the fish is small and provided with delicate mouth parts it is more successful in tackling the earlier instars than the later ones. In this respect the fish is likely to prove a valuable adjunct to other major larvivores like *Aplocheilus lineatus* (Job, 1940; John, 1940) and *A. panchax* (Job, 1940a) especially in the brackish waters of coastal districts.

The bionomics of *H. setnai*, as revealed from the interesting observations of Kulkarni, are quite favourable for utilising the species in anti-malarial work. While a typical backwater species common in puddles and pools of stagnant brackish-water, and breeding in sheltered places along the edges of the creeks, it extends 'to waters under tidal influence'. Even after the monsoon it is

noted to remain in large perennial pools within tidal limits to propagate the species. Covell's (1935, p. 40) requirements for larvicidal fish are to a great extent satisfied by this tiny toothed carp. Thus (1) the fish is 'small, so that it can get about in shallow water among weeds, etc.' (2) It is hardy, being recorded to be able to withstand a wide range of salinity varying from 4.363 to 1.348 per cent, and can even tolerate fresh-water within limits. (3) It breeds easily throughout the year (with a peak period during July and August). (4) It stands transport very well. A stock stood the train journey from Bombay to Calcutta¹ and thrived quite well thereafter. (5) It is an agile active fish with large eyes which are helpful in locating its prey and in detecting the approach of enemies. (6) It is absolutely insignificant and worthless as food. (7) It is carnivorous as is proved by a study of its stomach-contents as also by its short intestine. The fish is remarkably adapted for surface life. The head, which is flat dorsally and the upturned mouth are suitable adaptations. As Kulkarni has mentioned, the species, like *Aplocheilus*, occurs invariably near the surface of the water and mostly in the midst of aquatic plants, and 'is often found in swarms which move about in close formations'.

Thus it will be seen that *Horaiichthys setnai* is a suitable species for use in malarious areas of coastal waters, and its efficiency lies in its capacity to destroy mosquito larvae in their early instars.¹

T. J. JOB, M.Sc.,
Lady Tata Memorial
Research Scholar.

LABORATORIES OF THE ZOOLOGICAL
SURVEY OF INDIA, CALCUTTA.

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¹ Mr. Kulkarni kindly gave me some fish to experiment with from this stock which was brought by him to Calcutta, and my thanks are due to him for the same.